159.
THE SPEED MODULATION OF THE PATIENT'S ROTATION IN TSEI-RD TO IMPROVE THE HOMOGENEITY OF THE DOSE DISTRIBUTION IN THE HORIZONTAL PLANE. IN PHANTOM'S RESULTS

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Purpose: The aim of this study was to reduce the differences in doses accumulated in the points, localised in the same horizontal plane, on the patient's skin, during the rotary-dual total skin electron irradiation (TSEI RD).

Material and Method: During the standard TSEI RD technique, the patient was standing on the slowly and continuously rotating platform while the irradiation with two dual electron fields was performed. In this study a non-continuous platform movement was implemented. One cylindrical (diameter of 30 cm) and two elliptical (diameters of 20/40 cm and 25/35 cm) wax phantoms were used. The one full circle (360 degree) of the platform was divided into eight fractions. The platform speed was calculated individually for the each fraction. The total time of one rotation in both modes of the movements: continuous and non-continuous were equal. Phantoms were irradiated with two dual fields: size of 36x36 cm at the isocenter each, source-phantom distance of 300 cm, and with 6 MeV electrons' energy (output). Doses were measured with the semiconductor detectors which were placed equidistantly (distance between dosimetrical points by 45 degree) on the same horizontal plane on the phantom's surface.

Results: The respective measured doses after normalisation to those previously calculated were as follows: 1/ for the cylindrical phantom (diameter of 30 cm) - 100.1%, 99.8%, 100.3%, 99.4%, 100.1%, 99.8%, 100,3%, 99.4%; 2/ for the elliptical phantom of 25/35 cm – 98.3%, 99.6%, 103.2%, 99.2%, 97.8%, 99.6%, 103.2%, 100.7% and 3/ for the elliptical phantom of 20/40 cm – 95.8%, 99.9%, 105%, 98.8%, 95.8%, 100.2%, 105%, 99.3%. The modulation of the speed during platform's rotation resulted in the decrease of the dose discrepancies. The respective measured doses after the normalization performed with the same as above way were equal to: 1/ for the elliptical phantom of 25/35 cm – 99.4%, 99.9%, 101.3%, 100.5%, 100.1%, 100.9%, 101.1%, 99.7%; 2/ for the elliptical phantom of 20/40cm – 98.9%, 100.2%, 102.4%, 99.8%, 99%, 99.9%, 102.1%, 100.5%.

Conclusion: Results of the dose in-phantom measurements showed that the speed modulation of the platform reduced the dose inhomogeneity at the horizontal plane on the phantom's surface.

160.
TLD DOSIMETRY VERIFICATION OF DOSE OPTIMISATION METHOD USED IN ENDOVASCULAR BRACHYTHERAPY OF PERIPHERAL VESSELS

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Background: Multiple clinical trials had proven that endovascular brachytherapy can reduce the risk of restenosis from 30-60% to 5-15% if radiotherapy is planned and performed correctly. One of the most important parameter for the treatment planning is reference isodose length (RIL) defined as a vessel length at the reference depth (RD) covered by 90 % isodose. RIL depends on the source configuration – active source length (ASL), step times and reference depth. The reference isodose length must be greater or equal to planning target length (PTL) therefore the maximum intervention length (IL) must be smaller then RIL – 10 mm for safety margin.

Material and Method: The MicroSelectron HDR with Ir-192 source and the 5F catheter was used for treatment delivery. The dose distributions were calculated at

Plato ver. 14.1.3, and then optimised by internal algorithm for active source length of 10 cm (21 step positions) and reference depths of 5, 7 and 10 mm. TLD chips LIF 100 were used as the detectors after calibration in Co-60 photon beam and Harshaw 3500 as a reader. The catheter and TLD chips were placed in a wax-parafin phantom assuring the distance from the catheter to detectors equal to the reference depth (5, 7 and 10 mm). The measurements were preformed twice for every depth – for the non optimised treatment plan and for the plan with optimisation algorithm applied. The dose delivered at the reference distance was 10 Gy.

Results. The treatment plan was calculated for the active source length (ASL) of 10 cm. The RIL values calculated without optimisation of the step times, were: 8.9 cm, 9.28 cm and 8.96 cm. The measured RIL were: 8.64 cm, 9.6 cm, 8.32 cm (+/- 0.32 cm), for the RD = 5, 7 and 10 cm, respectively. For the optimised treatment plan, the calculated RIL were: 10.24 cm, 10.56 cm and 10.56 cm while the measured RIL were 10.24 cm, 10.56 cm and 9.92 cm (+/- 0.32 cm), for the RD = 5, 7 and 10 cm, respectively. The RIL measured during the treatment carried according to the optimised plan were by 1.60 cm, 0.96 cm and 1.60 cm longer then those for the treatment made without optimisation at the reference depths. The increase of the dose measured at the last distal and proximal position of the application were 35, 38 and 37% for RD = 5, 7 and 10 cm, respectively.

Conclusion. Optimisation of the treatment plan is the main tool for the accurate treatment delivery in endovascular brachytherapy. The TLD dosimeters showed the increase of the dose at distal and proximal parts of the active length (AL), and thus optimisation algorithm built in Plato ver. 14.1.3 has been proven to be correct for the above clinical situation.

161.
THE FREQUENT AND PRECISE MONITORING OF MUCOSAL REACTION DURING RADIATION THERAPY IN HEAD AND NECK CANCER PATIENTS AFFORDS POSSIBILITIES OF QUANTITATIVE REPORTING AND PREDICTING ITS SEVERITY

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Background. Numerous prospective clinical studies on acute radiation mucosal toxicity have been doing over the last 10 years in Gliwice Oncology Centre. Consequence of those experiences is the policy of detailed monitoring and reporting of many objective and subjective symptoms estimating the incidence and pattern of radiation mucositis.

Aim. To evaluate clinical and treatment-related factors influencing on duration of healing, incidence and severity of mucositis and overall duration of acute mucosal reaction.

Material and Methods. The unique data set of careful and frequent observations of mucosal radiation reaction in 88 consecutive patients (pts) with head and neck cancer treated by radiation alone have been included into the analysis. There were 35 pts treated by conventional fractionation with 2.0Gy per fraction and 4 pts with 2.5Gy per fraction (CF), 33 pts treated by accelerated fractionation (CAIR), 8 pts by hyperfractionation (HF), and 8 pts with glottic T1 cancer treated by hypofractionation of 3Gy per day (hF). All patients have been observed everyday with examination of oral cavity, pharynx and larynx done 3 times weekly, by the same, well experienced radiation oncologist, according to the own scoring system based on the Dische' suggestions. The monitoring of mucosal reaction has been always beginning at the 1st day of treatment, before radiation fraction, followed after the end of treatment, up to the disappearance of any symptom (except xerostomia), what was identified as a complete healing of mucosa.